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EFFECT OF BYPASS FAT SUPPLEMENTATION ON MILK YIELDS AND MILK COMPOSITION OF SAHIWAL DAIRY COW

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ABSTRACT

Role of bypass fat in rations of the high producing dairy animals is very crucial for enhancing the energy density of the ration. The experiment was conducted in animals of advance pregnancy at Government dairy farm. Twelve cows were selected for the trial and divided into two groups. Control group was fed with a basal diet alone and animals of treatment group received bypass fat @100g/day/animal along with basal diet for the period of 28 days. Significant (P<0.05) increase in milk production and non-significant (P>0.05) increase in SNF, lactose and protein was observed in treatment group as compared to control one.

KEYWORDS: Energy, Rumen, Milk, Bypass & Fat

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Original Article

INTRODUCTION

Pregnancy and lactation are the physiological states which modify metabolism in animals and induce stress. The period of transition between late pregnancy (-3 weeks) and early lactation (+3 weeks) presents huge metabolic challenges in terms of energy balance, plasma metabolites and hormonal changes (Singh et al., 2015). Energy density in the ration of lactating animals is low in developing calories, and hence is not able to meet the energy requirements after calving, as dry matter intake during this period (8-10 weeks) is low.

During early lactation, the amount of energy required for maintenance of body tissues and milk production often exceeds the amount of energy available from the diet (Goff and Horst, 1997), thus forcing mobilization of body fat reserves to satisfy energy requirement. This leads to substantial loss in body weight, which adversely affects production and reproduction in dairy cows. Energy density of ration can be increased by incorporating bypass fat in ration of lactating animals. Thus, supplied more energy for milk synthesis, resulting in overall improvement in productivity and health of animals. Dietary fat that resist lipolysis and bio-hydrogenation

in rumen by rumen microorganisms, but gets digested in lower digestive tract is known as bypass fat or rumen protected fat or inert fat. The use of bypass fat and protein has been the topic of research to augment milk production for many years (Kumar *et al*., 2014).

METHODS

In the present study, total of 12 healthy advanced pregnant cows (15 days before expected parturition) were selected from Government Dairy Farm, Bull Mother Experimental farm, College of Veterinary Science and A. H., Anjora, Durg and divided randomly into two groups. Group I comprised of 06 advance pregnant cow, kept without supplementation of bypass fat as normal control group and given only basal diets, 15 days before and up to 4 weeks after parturition. However, the animals of Group II (treatment) of 18 advanced pregnant cows was supplemented with rumen bypass fat ("Extra Energy Plus"- each kg contains pure bypass fat 200 gm, fermented live yeast culture – 50 gm, calcium propionate- 10gm, and chromium chelated with amino acid- 40 gm) @ 100gm/ animal/ day along with basal diet, 15 days before and upto 4 weeks after parturition. The milk sample was collected on 7th, 14th, 21st and 28th day after parturition. Milk composition was estimated by Gerber-Funke Milk analyzer.

RESULTS

The results of the above mentioned pilot research work has been mentioned in form of tabular and technical format as below:

Table 1: Mean± S. E. of Milk Production (Litres/Day) in Control and Treated Animals

Groups	0 Day	7th Day	14th Day	21st Day	28th Day
Control	6.33±0.04^{a}	6.51±0.05^{a**}	6.61±0.03 ^{a**}	6.34±0.02 ^{a}	6.36±0.01 ^{a}
Treatment	6.41±0.05^{b}	6.64±0.03^{b**}	6.71±0.04^{b**}	6.83±0.05 ^{b**}	6.91±0.04 ^{b**}

Mean± S. E. bearing double asterisk differ significantly at 5% level.

The animals of treated group which were supplemented with bypass fat showed significant (P<0.05) improvement in milk yield throughout the observation period as compared to the animals of control group (Table 1).

The milk yield in treated group showed highly significant (P<0.001) increase on 7th, 14th, 21stand 28th days of parturition as compared to milk yield on '0' day. However, the control group animals showed highly significant (P<0.001) increase in milk yield initially on 7thand 14th day and, thereafter, milk yield was non-significantly (P>0.05) higher than the milk yield on '0' day.

The milk yield in bypass fat supplemented animals was increased significantly throughout the observation period as compared to animals of control group.

Table 2: Mean± S. E. of Milk Fat (%) in Control and Treated Animals

Groups	0 Day	7th Day	14th Day	21st Day	28th Day
Control	3.42±0.03	3.53±0.04^{a**}	3.61±0.03 ^{a**}	3.36±0.02 ^{a}	3.29±0.01 ^{a}
Treatment	3.46±0.04	3.65±0.03^{b**}	3.71±0.02^{b**}	3.73±0.01 ^{b**}	3.76±0.04 ^{b**}

Mean± S. E. bearing double asterisk differ significantly at 5% level.

The animals of treated group showed non-significantly (P>0.05) higher milk fat percentage on day 0 as compared to control group followed by. However, the animals of treated group revealed significantly (P<0.05) higher milk fat percentage from 7th day onwards till end of the observation period as compared to the animals of control group (Table 1).

The milk fat percentage in treated group showed highly significant (P<0.001) increase on 7th, 14th, 21stand 28th day as compared milk fat percentage on '0' day. However, the control group animals showed highly significant (P<0.001) increase in milk fat percentage on 7thand 14th day. Thereafter milk fat percentage declined non-significantly (P>0.05) than the milk fat percentage on '0' day.

The fat percent of milk was increased significantly during the period of study in treated animals when compared to initial milk fat percentage.

Table 3: Mean± S. E. of SNF (%) in Control and Treated Animals

Group	0 Day	7th Day	14th Day	21st Day	28th Day
Control	9.47±0.05	9.50±0.04[a*]	9.65±0.02 [a**]	9.44±0.03 [a]	9.45±0.02 [a]
Treatment	9.41±0.04	9.44±0.02[b]	9.59±0.03[b**]	9.38±0.02 [b]	9.39±0.03 [b]

Mean± S. E. bearing double asterisk differ significantly at 5% level.

The animals receiving bypass fat supplementation (treated group) showed non-significantly (P>0.05) lower SNF percentage throughout the observation period as compared to control group (Table 1).

The milk SNF percentage in treated group showed non-significant (P>0.05) increase in SNF percentage on day 7 followed by highly significant (P<0.001) increase in SNF on 14th day as compared milk fat percentage on '0' day. Thereafter, the milk SNF percentage was non-significantly (P>0.05) decreased on 21st and 28th day of observation period as compared to day '0'. However, the control group animals showed highly significant (P<0.001) increase in milk SNF percentage on 7thand 14th day and, thereafter, milk SNF percentage was non-significantly (P>0.05) lower than the milk SNF percentage on '0' day.

The animals of treated group showed significantly lower SNF percentage as compared to animals of control group throughout the observation period.

Table 4: Mean± S. E. of Lactose (%) in Control and Treated Animals

Group	0 Day	7th Day	14th Day	21st Day	28th Day
Control	5.40±0.03	5.45±0.04	5.49±0.04	5.55±0.04*	5.62±0.02**
Treatment	5.52±0.04	5.59±0.02	5.43±0.03	5.50±0.02	5.52±0.04

Mean± S. E. bearing double asterisk differ significantly at 5% level.

The animals of treated group showed non-significantly (P>0.05) higher milk lactose percentage on day 0 and 7th as compared to control group (Table 4). However, the animals of treated group revealed non-significantly (P<0.05) lower milk lactose percentage from 14th day onwards till end of the observation period as compared to the animals of control group.

The milk lactose percentage in treated group showed non-significant (P>0.05) increase on 7thday followed by non-significant (P>0.05) decrease till completion of the observation period as compared to '0' day. However, the control group animals showed non-significant (P>0.05) increase in milk lactose percentage on 7thand 14th day and, thereafter, milk lactose percentage was significantly (P<0.05) increased on 21st and 28th day as compared to '0' day.

The animals of both groups showed non-significant differences in lactose percentage throughout the observation period.

Table 5: Mean± S. E. of Protein (%) in Control and Treated Animals

Group	0 Day	7th Day	14th Day	21st Day	28th Day
Control	3.42±0.05	3.43±0.04	3.43±0.02	3.44±0.03	3.45±0.02
Treatment	3.46±0.04	3.47±0.02	3.45±0.03	3.47±0.02	3.47±0.03

Mean± S. E. bearing double asterisk differ significantly at 5% level.

The animals of treated group showed non-significantly (P>0.05) higher milk protein percentage as compared to control group throughout the observation period (Table 5).

The animals of both groups (treatment and control group) revealed non-significant (P>0.05) increase in milk protein percentage at most of the time intervals throughout the observation period as compared to '0' day.

The milk protein percent was non-significantly different in the animals of both groups throughout the observation period.

DISCUSSIONS

In the present investigation, there was a significant improvement in milk yield in animals supplemented with bypass fat as compared to animals in control group. The findings of the present study are in accordance with the findings of Dhulipalla *et al* (2013). The improvement in milk yield can be attributed the chromium and calcium propionate incorporated in the bypass fat supplement. The propionate acts as a gluconeogenic precursor at a time, when the cow is in negative energy balance. Chromium, known to increase glucose use by cells, thus increase glucose entry to adipocytes, increase the lipogenesis from acetate and decrease net fatty acid release from the cell resulted into increase milk production and also, postulated that increase milk yield might be the result of the indirect effect of chromium on hepatic glucose production (Mc Namara and Valdez, 2005).

The fat percentage of milk was increase significantly during study in treated animals supplemented with bypass fat. Rohila et al., (2016) reported a clear cut rise in milk fat, due to supplementation of bypass fat. According to Ashes *et al.* (1997) the effect of fat supplementation on milk fat and fatty acids composition are influenced by the type and amount of dietary fat degree of inertness or protection in the rumen.

There was significant lower SNF percentage compared to control group. On the other hand, Sirohi *et al.* 2010 reported no effect of bypass fat on milk protein and SNF in treatment group. Polidori *et al.*1997 reported decreased milk in some experiments.

There was no significant difference in lactose percentage.

CONCLUSIONS

The present study it is concluded that rumen bypass fat (Extra Energy Plus) @ 100g/ cow/day is effective in improving milk yield and milk fat per cent and proved to be effective in fulfilling the energy demand for milk production.

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